CASE REPORT

Modified Peripheral Iris Fixation of a Foldable Intraocular Lens Following Phacoemulsification

*Jia-Kang Wang, Pei-Ching Lai**

In this report, we describe the case of an aphakic patient who underwent peripheral iris fixation of a foldable posterior chamber intraocular lens (IOL) in the absence of capsular support. The patient suffered from traumatic cataract with partial zonular dehiscence. He received phacoemulsification, and capsular rupture occurred subsequently. After complete anterior vitrectomy, the lens capsule disappeared completely. Six months later, secondary IOL implantation was performed. A clear corneal incision was made, and a paracentesis was created to insert a folded acrylic soft IOL and a temporary supporting device. The optic of a three-piece acrylic IOL was folded along the axis of the haptics, and both the haptics were bent and quickly maneuvered into the folded furrow of the optic. A bimanual unfolding maneuver created pupillary capture of the optic for stabilization and centration of the IOL, with the haptics expanding on the back surface of the iris, and the haptics were fixated to the peripheral iris with modified McCannel suturing. Fair visual outcome without complications was noted.

KEY WORDS — capsular support, foldable acrylic intraocular lens, modified McCannel suturing, modified peripheral iris fixation technique

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Introduction

Implantation of an intraocular lens (IOL) in the absence of capsular and zonular support is a challenge to the ophthalmologist. The options for implantation include the insertion of an anterior chamber (AC) IOL, a scleral-fixated posterior chamber (PC) IOL, or an iris-fixated PC IOL. Implantation of an AC IOL is easy to manipulate, but corneal decompensation, glaucoma, chronic inflammation, and associated complications may result in visual impairment [1]. Because fixation sutures are blindly passed through the highly vascular ciliary body, intraocular hemorrhage and tilting of the lens may occur following transscleral fixation of a PC IOL [2]. In a previous study, transscleral fixation caused IOL tilt in 10% of patients because of the different levels of fixation between the two haptics [2]. Using

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ultrasound biomicroscopic analysis, it was found that in 54 of 86 (62.8%) patients receiving scleral-fixated IOLs, the haptics were not seen on the ciliary sulcus [3]. In another report, transscleral fixation resulted in one vitreous hemorrhage and two hyphemas in 32 patients, which were caused by inadvertent trauma to the ciliary body or iris root [4]. Besides, scleral sutures can serve as conduits between the exterior and the interior of the eye, increasing the risk of late endophthalmitis [5]. In recent studies, iris fixation of a foldable PC IOL provided a safe and effective way to implant an IOL without capsular support in aphakic patients [6,7]. This novel method not only avoided complications caused by the above-mentioned AC IOL and scleral-fixated PC IOL, but also prevented adverse effects of the large limbal wound. This limbal wound is needed to implant a rigid IOL. A small self-sealing clear corneal incision was made to insert a folded acrylic soft IOL. A bimanual unfolding maneuver created pupillary capture of the optic to temporarily stabilize the IOL, with the haptics expanding on the back surface of the iris and being fixated to the peripheral iris with modified McCannel sutures [8]. In this report, the previous procedure was modified, performing fewer paracenteses and changing the folding pattern of the IOL. This modified technique shortened operation time and reduced the probability of postoperative complications.

Case Report

A 45-year-old patient suffered from traumatic cataract with phacodonesis and partial zonular dehiscence. Capsular rupture occurred during phacoemulsification. The wound was extended, and the lens fragments were removed with a lens loop. Anterior vitrectomy was performed to remove residual cortex and prolapsed vitreous. The lens capsule was also eliminated completely due to severe disfiguration of the remnant capsule. Aphakia was noted postoperatively. Six months later, best-corrected visual acuity (BCVA) was 12/20 with a correction of +11.5/–0.5×180°. Examination of the anterior segment, posterior segment, and intraocular pressure did not reveal any abnormalities.

After obtaining the patient's consent, secondary implantation of an IOL was performed. Phenylephrine 5% eye drops (Neosinicin®; Oasis, Taipei, Taiwan) was used for mid-dilation of the pupil. A retrobulbar block was performed prior to a 3.5-mm temporal clear-cornea incision. Sodium hyaluronate 3% and sodium chondroitin sulfate 4% (Viscoat®; Alcon Laboratories, Fort Worth, TX, USA) were injected for the deepening of the AC, as a precaution to avoid pupillary expansion. More viscoelastic material was placed behind the pupillary plane to tamponade vitreous prolapse. A 1.0-mm peripheral paracentesis incision was made at the 10 o'clock position, 150° from the corneal incision. The optic of a three-piece soft acrylic IOL (ACRYSOF®; Alcon Laboratories) was folded along the axis of the haptics, i.e. at the 6–12 o'clock meridian. Both the haptics were bent and temporarily inserted into the folded furrow of the optic (Figs. 1 and 2). The folded IOL was inserted at the level of the iris (Fig. 3). The optic fold was relaxed to some extent, and a phaco spatula (Katena Products, Danville, NJ, USA), with the tip pointing downward, was passed through the opposite paracentesis and gently placed under the folded optic (Fig. 4). The IOL was slowly

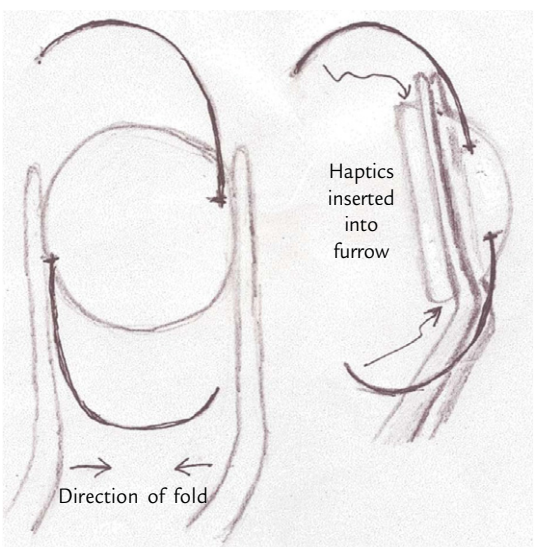

Fig. 1. *The optic of a three-piece soft acrylic intraocular lens was folded along the axis of the haptics.*

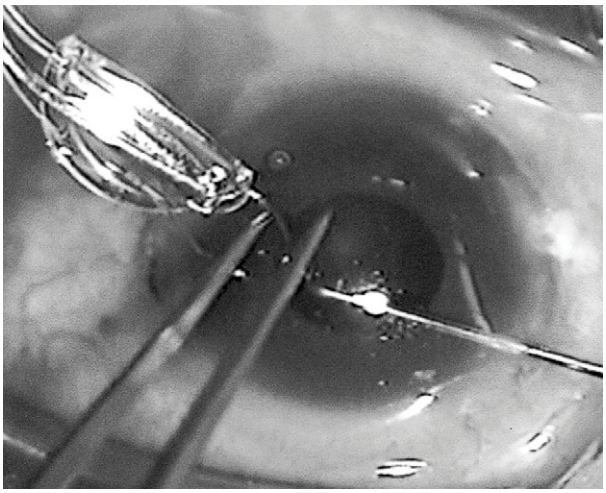

Fig. 2. *The leading haptic was bent into a loop and inserted into the groove of the folded optic.*

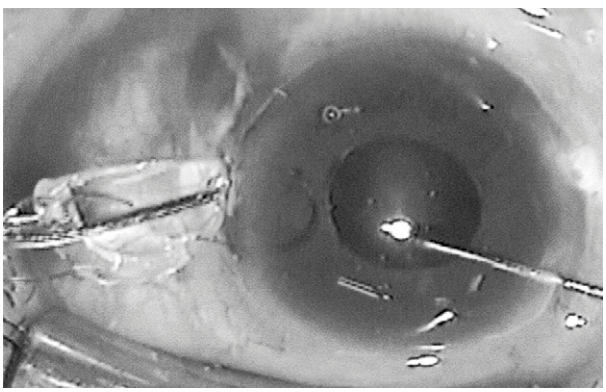

Fig. 3. *The folded intraocular lens with the loop of the haptic was placed into the chamber.*

unfolded, allowing the haptics to extend behind the posterior iris surface, while the optic, supported by the spatula above the iris plane, was completely captured by the pupil and stabilized. The spatula was then removed. Two modified McCannel-type iris-fixation sutures were made through the paracentesis and corneal incisions, using 10-0 polypropylene suture material on long, curved needles (Ethicon CIF-4; Ethicon, Somerville, NJ, USA). After inserting the needle into the chamber from one side of the corneal incision or paracentesis, the tip was passed through the peripheral iris, behind the haptic, and out through the iris and peripheral cornea on the other side of the corneal wound (Fig. 5). Both suture ends were retrieved from the corneal incision and the paracentesis with a Sinskey hook (Fig. 6). The sutures were knotted, and the suture ends were trimmed after gentle retraction of the knots nearly out of the corneal wounds (Fig. 7). The sutures fixated the haptics to the peripheral iris. The optic was positioned in the plane under the iris by McPherson forceps. The viscoelastic material was washed out with gentle irrigation and aspiration. The corneal wound was left sutureless without wound leakage.

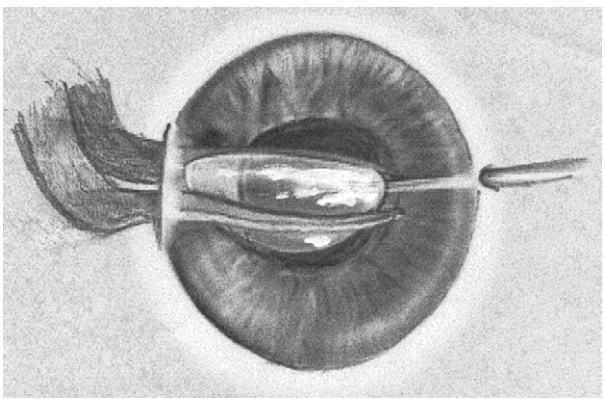

Fig. 4. *A phaco spatula, passed through the paracentesis, was gently placed under the folded optic to support the optic above the iris plane.*

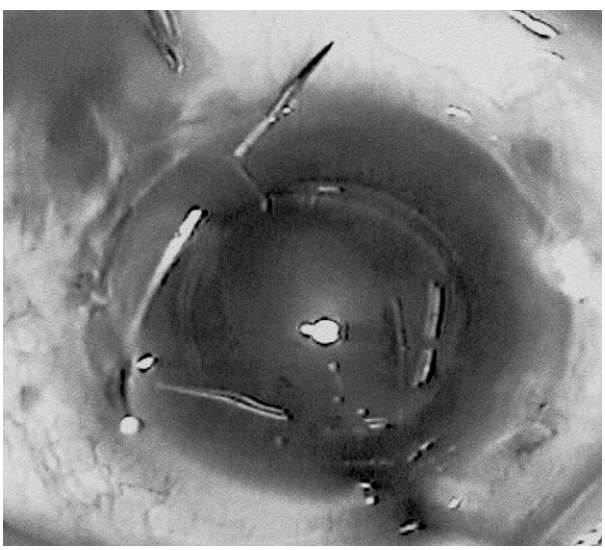

Fig. 5. *After the needle was inserted into the chamber from one side of the corneal incision, its tip was passed through the peripheral iris, behind the haptic, and out through the iris and peripheral cornea on the other side. The intraocular lens was stabilized by pupillary capture of the optic, and the placement resulted in pupil ovalization.*

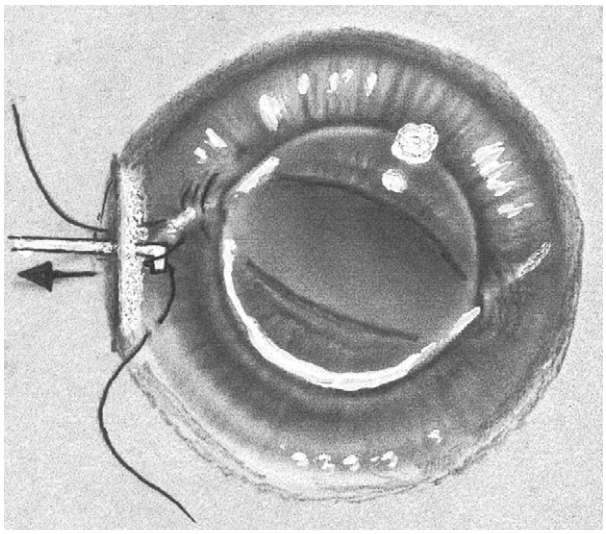

Fig. 6. *Both suture ends were retrieved from the corneal incision with a Sinskey hook.*

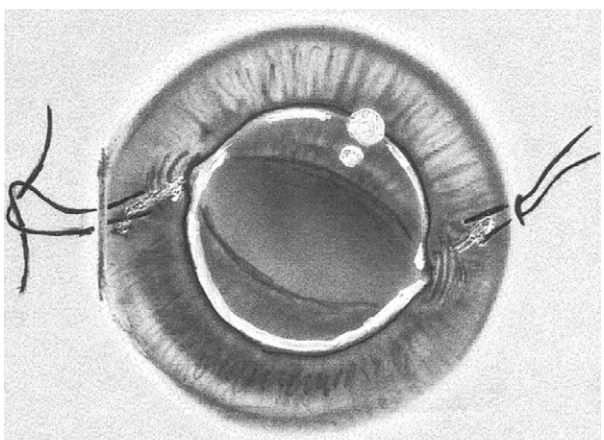

Fig. 7. *After the sutures were knotted, the suture ends were gently pulled to the corneal incisions for trimming.*

Postoperative medications included topical gentamicin and dexamethasone for 2–3 weeks until the reaction in the AC vanished. Seven months after operation, BCVA was 14/20 with a correction of –0.5/–0.75×180°, with a keratometric reading of –0.75×180°. The patient was satisfied with the visual results and experienced no discomfort.

Discussion

Iris fixation of PC IOLs in the eyes of patients without capsular support has been reported, mostly during penetrating keratoplasty [9–11]. Fixation of the lens optic to the posterior aspect of the mid-peripheral iris using polypropylene sutures inserted through the lens positioning holes has provided satisfactory results in studies that included hundreds of patients [9,10]. This technique also avoids the side effects caused by the implantation of an AC IOL or scleral-fixated PC IOL, and permits the optical correction to be brought closer to the nodal point of the eye. In a large randomized trial of IOL fixation techniques during penetrating keratoplasty in 176 patients, Schein et al found that iris fixation was the best tolerated of the investigated methods in supporting a PC IOL in the absence of lens capsule support [12]. The risk of an adverse outcome (such as glaucoma, cystoid macular edema, IOL dislocation, graft failure) was significantly less for the iris fixation group than for either the AC IOL or scleral fixation group. However, late breakage of fixational polypropylene sutures with iris-fixated lenses has occurred in five out of 97 cases after a mean follow-up of 112 months [13]. It was hypothesized that the fixation sutures were eroded by the sharp edge of a positioning hole located on the IOL optic. In addition, some restriction of pupillary motility may stem from traditional four-point iris fixation.

The papers by Stutzman and Stark [6], Condon [7], and this present report have described another method for iris fixation of a PC IOL during its secondary implantation, which consists of pupil entrapment of the lens optic in the AC, placement of the lens haptics behind the iris, and securing the IOL with modified McCannel sutures to the peripheral iris. The new procedure avoids possible future suture breakage because the sutures are fixed to a smooth polymethylmethacrylate haptic. There was no suture breakdown or loosening during short-term follow-up in this and previous reports [6,7]. The peripheral iris is relatively immobile, which allows a firmer adhesion of the haptics, without affecting pupillary movement. The planes of the optic and pupil were parallel following the fixation of the PC IOL to the iris. As in the previous reports [6,7], we found that the postoperative amount of

manifest astigmatism was nearly equal to that of keratometric astigmatism, which substantially proved the absence of lens tilt; there were also no major complications such as intraocular hemorrhage or infection.

Traditionally, more than a 7-mm long limbal wound is needed for rigid IOL insertion, predisposing patients to intraoperative and postoperative complications. Hypotony, even expulsive hemorrhage, is a reported complication of traditional cataract surgery or secondary IOL implantation involving an 8- to 12-mm incision [2]. Astigmatism and a higher incidence of macular edema also occurred after implantations requiring large limbal openings [14]. When a foldable IOL is used, whose implantation requires only a 3.5-mm sutureless wound, complications associated with a large wound are avoided.

The methods of iris fixation described in the previous reports [6,7] were modified in two ways: the number of paracenteses was reduced and the IOL folding procedure was changed. Only one paracentesis was required in this case, instead of three separate paracenteses that were previously reported. The use of fewer corneal entry sites reduced the time required for operation and the probability of wound-related complications, such as wound leakage, formation of flat chambers, and intraocular infection. Because the procedure used only one paracentesis for IOL insertion, the IOL had to be folded along the axis of the haptics, in contrast to the "mustache" pattern of IOL folding used previously [6,7]. The flexibility of the three-piece ACRYSOF® haptics led, at times, to twisting during IOL insertion and impeded further advancement into the plane under the iris while in contact with the pupillary edge. Moreover, rotation or pronation of the haptic was needed to position it in the retropupillary space. Both haptics were bent and inserted into the folding groove of the optic before IOL placement, which facilitated smooth and quick implantation of the haptics behind the iris. This modified technique also saved operating time. While performing the previously described technique [6,7] on another aphakic patient, 45 minutes were needed for the entire procedure, but only 30 minutes were needed to complete the operation in this case with the modified technique.

We have described a modified peripheral iris fixation of a foldable PC IOL for use in patients requiring secondary IOL implantation without capsular support. The method involves only a small corneal incision and avoids complications associated with the implantation of AC IOLs and scleral-fixated PC IOLs. As operating time and the number of necessary paracenteses are reduced, this modified procedure is also more efficient and safer than previously described techniques. The patient was satisfied with his vision and experienced no complications.

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